

Insulation



TECHNICAL BULLETIN

Compliance with Approved Document B Volumes 1 & 2

Meeting the Functional Requirements of Section B4 for External Walls &
Roofs - England - 2020 Edition



Contents

	Page
Introduction	3
Approved Document B	3
Walls - Approved Document B	4
Relevant Buildings Above 18 m	4
Non-relevant Buildings Above 18 m	5
Alternative Approach to Compliance	5
Buildings Below 18 m	5
Compliance Route for Kingspan's External Wall Insulation Solutions	6
Relevant Buildings Above 18 m	6
Non-relevant Buildings Above 18 m	6
Kingspan Insulation's Commitment	6
Roofs - Approved Document B	7
Compliance for Roofs	7
Compliance Route for Kingspan's Flat Roof Insulation Solutions	8
Relevant Buildings Above 18 m	8
Non-relevant Buildings Above 18 m	8
Test Data	8
Other Design Considerations	9
Factors to Consider	9
Appendix	10
Exact System Test Data - Kingspan Kooltherm® K15	10
Exact System Test Data - Kingspan Kooltherm® K5	16
Exact System Test Data - Kingspan TEK® Cladding Panel	17
Exact System Test Data - K-Roc™ Rainscreen Slab	18

Introduction

Approved Document B

Approved Document B (ADB), published by the Ministry of Housing, Communities & Local Government (MHCLG), gives technical guidance on how to meet the requirements of the Building Regulations 2010 (as amended), for building work carried out in England.

There are two parts to Approved Document B:

- Approved Document B (Fire Safety) Volume 1: Dwellings (ADB V1); and
- Approved Document B (Fire Safety) Volume 2: Buildings other than dwellings (ADB V2).

In July 2019, a clarified version of Approved Document B was published. The guidance took effect on August 30th 2019 and, where it is being used as the basis for the fire safety design, applies to building work which starts after this date. The guidance does not apply in respect of work already commenced before that date or in respect of work for which a building or initial notice has been given or full plans deposited before that date (provided work commences within two months of that date).

ADB Section B4 deals with the following requirement from Part B of Schedule 1 to the Building Regulations 2010:

- B4 (1) the external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building; and
- B4 (2) the roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.

Walls - Approved Document B

Relevant Buildings Above 18 m

Regulation 7(4) sets out what is considered a relevant and non-relevant building.

For the following building types, there is one route to compliance with the fire safety requirements of the Building Regulations regarding the insulation and other materials in external walls on buildings with a storey 18 m, or greater, above ground level:

- a building which contains one or more dwellings;
- an institution; and
- a room for residential purposes (excluding any room in a hostel, hotel or a boarding house). This includes student accommodation, care homes, sheltered housing, hospitals, dormitories in boarding schools.

Linear Route

For the buildings listed above, all materials which become part of an external wall (including insulation) or specified attachments must meet the requirements of Regulation 7(2). They must achieve European Classification (Euroclass) A2-s1,d0 or A1. Materials can demonstrate they achieve these classifications through small scale fire tests. Unlike in large scale system fire tests, testing is performed on the material or component in isolation from all other materials comprising the façade system. As such, material fire performance determined via this route is not wholly representative of that for the complete system build-up and the provision of additional items such as cavity barriers is expected as part of a compliant design. It is important to note that the requirements of Regulation 7(2) are compulsory and must be adhered to.

The requirements for external walls in Regulation 7(2) also apply to specified attachments in relevant buildings. Specified attachments are defined in Regulation 2 and include balconies attached to an external wall. Therefore, balconies (an attachment to a wall unheated on both sides), also including attached and inset balconies, would need to meet the same requirements as walls*. Terraces and roofs however (with a heated space below) are exempt. For more information, an additional advice note was released by the Ministry of Housing, Communities & Local Government on June 24th 2019 providing advice specifically on balconies for residential buildings with multiple dwellings. Guidance can also be found within BS 8579: 2020 (Guide to the design of balconies and terraces).

* NB Interpretation is determined by Local Building Control and further guidance should be sought.

As listed in Regulation 7(3), the following elements of the façade are excluded from the above classification requirements:

- cavity trays when used between two leaves of masonry;
- any part of a roof (other than any part of a roof which falls within paragraph (iv) of regulation 2(6)) if that part is connected to an external wall;
- door frames and doors;
- electrical installations;
- insulation and water proofing materials used below ground level;
- intumescent and fire stopping materials where the inclusion of the materials is necessary to meet the requirements of Part B of Schedule 1;
- membranes
- seals, gaskets, fixings, sealants and backer rods;
- thermal break materials where the inclusion of the materials is necessary to meet the thermal bridging requirements of Part L of Schedule 1; and
- window frames and glass.

Non-relevant Buildings Above 18 m

For any buildings not listed as relevant in Regulation 7(4) there are four routes to compliance with the fire safety requirements of the Building Regulations regarding the insulation in external walls on buildings with a storey 18 m, or greater, above ground level.

Linear Route

This route requires the insulation to be class A2-s3,d2, or better, which, in this context, is defined by being a material that either is subject to 'Classification without Further Testing (CWFT)' or has met the required performance criteria after having been subjected to specific small scale fire tests. Unlike in large scale system fire tests, testing is performed on the insulation in isolation from all other materials comprising the façade system. As such, material performance determined via this route is not wholly representative of that for the complete system build-up and the provision of cavity barriers, penetration seals etc. needs to be suitably specified.

It is important to note that the the requirement above does not apply to masonry cavity wall constructions which comply with Diagram 9.2 in Section 9 of ADBV2. This diagram details a construction with two leaves of brick or concrete each at least 75 mm thick, a closed cavity around all openings and a closed cavity at the top of the wall (unless the cavity is totally filled with insulation).

It is also advised "the core (filler) within an Aluminium Composite Material (ACM) is an "insulation material/ product", "insulation product", and/or "filler material" as referred to in Paragraphs 10.6 (ADB V1) and 12.6 (ADB V2) ("Insulation Materials/Products") in Sections 10 (ADB V1) and 12 (ADB V2) and therefore should be class A2-s3,d2 or better.

Walls - Approved Document B

Performance-based Route

Secondly, a performance-based route is also offered. The guidance requires that the complete façade build-up meets the performance criteria set out in BRE report: BRE 135 (Fire performance of external thermal insulation for walls of multistorey buildings 2013) using large scale test data from:

- BS 8414-1 (Fire performance of external cladding systems. Test method for non-loadbearing external cladding systems applied to the masonry face of a building); or
- BS 8414-2 (Fire performance of external cladding systems. Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame).

Assessment-based Route

The guidance given in Appendix B of ADB should be followed. Assessments should not be regarded as a way to avoid testing and this option should only be used where sufficient relevant test evidence is available.

Where an assessment is used in lieu of a test, this should be done by organisations with the necessary expertise (for example, organisations listed as 'notified bodies' in accordance with the European Construction or laboratories accredited by the United Kingdom Accreditation Service), in accordance with the relevant standard for extended application for the test in question.

For external wall applications, the British Standards Institute (BSi) has drafted a standard for extended application, BS 9414: 2019 (Fire performance of external cladding systems. The application of results from BS 8414-1 and BS 8414-2 tests). The standard provides guidelines on what variations are possible to cladding systems, which have been tested in line with the existing BS 8414 standards.

Extended application enables a prediction to be made on the expected fire performance of a system under specified fire conditions if one or more of the components or parameters, which had been evaluated as part of the test specimen, were to be changed. In the specific case of external cladding systems, such predictions are based upon the need to abide strictly with the fundamental principle that the fire performance of the modified system would be equal or better if it were to be subjected to a BS 8414-1 or BS 8414-2 test.

The BS 9414 standard covers insulated and ventilated rainscreen systems, external thermal insulated composite systems and structural insulated panels. Please consult Approved Document B for more information.

For performance classifications where there is no specific standard for extended application, assessment reports should be produced in accordance with the principles of BS EN 15725 : 2010 (Extended application reports on the fire performance of construction products and building elements).

Details of the test evidence that has been used to support the assessment should be included. This option requires the report to be supported by the results of testing by a suitable UKAS accredited testing body, and to specifically reference any tests that have been carried out on the products.

Alternative Approach to Compliance - Fire Safety Engineering Route

Based upon scientific principles, and in line with the BS 7974 suite of documents, from an integrated or a 'whole building' perspective, fire safety engineering not only considers the performance of structures, systems, products and materials when exposed to fire, it also includes human behavioural aspects, fire prevention and active and passive fire protection measures e.g. effective means of egress and adequate measures for alarm, detection, control and extinguishment.

Furthermore, it can facilitate innovation in building design without compromising fire safety, particularly in some large and complex buildings, as well as multi-purpose buildings, where it may be the only practical way to achieve a satisfactory level of fire safety.

Buildings Below 18 m

Regulation 7(2) is only applicable to relevant buildings over 18 m and relevant buildings. However, products used in any building still need to meet all of the requirements of the Building Regulations (not just ADB) and design should be mindful of correct and effective cavity barrier detailing.

Compliance Routes for Kingspan's External Wall Insulation Solutions

Kingspan Insulation offers the following external wall insulation solutions that can be used above 18 m:

- Kingspan Kooltherm® K106 Cavity Board;
- Kingspan Kooltherm® K108 Cavity Board;
- Kingspan Kooltherm® K5 External Wall Board;
- Kingspan Kooltherm® K15 Rainscreen Board;
- Kingspan TEK® Cladding Panel;
- K-Roc™ Rainscreen Slab; and
- K-Roc™ Rainscreen Slab HD.

Relevant Buildings Above 18 m

K-Roc™ Rainscreen Slab and K-Roc™ Rainscreen Slab HD achieve Euroclass A1 when classified to EN 13501-1: 2018, therefore can be used on relevant buildings above 18 m.

The other solutions listed above do not achieve Euroclass A2-s1,d0 or A1, and so, the linear and the fire safety engineering routes to compliance are not open for them.

Non-relevant Buildings Above 18 m

Linear Route

K-Roc™ Rainscreen Slab and K-Roc™ Rainscreen Slab HD achieve Euroclass A1 when classified to EN 13501-1: 2018, and so, the linear route to compliance is open for these two products.

Whilst Kingspan Kooltherm® K106 and K108 do not achieve Euroclass A2-s3,d2 or better, this restriction does not apply to masonry cavity wall constructions which comply with Diagram 8.2 in Section 9 of ADBV1 or Diagram 9.2 in Section 9 of ADBV2. This diagram details a construction with two leaves of brick or concrete each at least 75 mm thick, a closed cavity around the opening and a closed cavity at the top of the wall (unless the cavity is totally filled with insulation).

Performance-based Route

Kingspan Kooltherm® K5, Kingspan Kooltherm® K15, Kingspan TEK® Cladding Panel and K-Roc™ Rainscreen Slab have been tested in specific systems to BS 8414-1: 2015 + A1: 2017 and BS 8414-2: 2005 / BS 8414-2: 2015 + A1: 2017, or both, in accordance with the performance criteria set out in BR 135: 2013.

Test reports owned by Kingspan Insulation are available for download at www.kingspan.com/gb/bs-8414-systems or further information can be provided by emailing highrisetechnical@kingspan.com. Note that the end use design needs to be carefully considered to replicate the design details used in the tested sample.

Assessment-based Route

The Kingspan Insulation products listed above can be used with this route, in accordance with the rules set out in BS 9414.

Fire Safety Engineering Route

The Kingspan Insulation products listed above can be used with this route.



Coleg Cymunedol Y Dderwen Comprehensive School, Bridgend.

Kingspan Insulation's Commitment

Kingspan Insulation is committed to a continuing program of testing, both independently and collaboratively, to increase the breadth of BS 8414 fire test data for its external wall products in common build-ups.

Furthermore, Kingspan Insulation has a dedicated technical advisory service for those seeking assistance on projects where these products are specified for use in high-rise buildings.

Kingspan Insulation will endeavour to assist those seeking:

- collaboration on large scale testing programs; and
- evidence of performance e.g. official reports and certification.

Email highrisetechnical@kingspan.com for further information.

Roofs - Approved Document B

Compliance for Roofs

Any part of a roof (other than any part of a roof which falls within paragraph (iv) of Regulation 2(6)) if that part is connected to an external wall, is exempt from the classification requirements of Regulation 7(2). However the limitations on roof coverings as set out in Table 14.1 of ADB should be followed and the roof system should be classified to EN 13501-5. This is outlined in Table 1.

Alternatively, roofs intended to be fully covered by inorganic materials, listed as per Commission Decision 2000/553/EC of 6th of September 2000, implementing Council Directive 89/106/ECC can be considered to fulfil the external fire performance requirements without the need for testing. These are:

- loose laid gravel ≥ 50 mm or ≥ 80 kgm² (size 4-32 mm);
- sand/cement screed ≥ 30 mm; or
- cast stone/mineral slabs ≥ 40 mm.

NB Paragraph (iv) of Regulation 2(6) refers to any part of a roof pitched at an angle of more than 70 degrees to the horizontal if that part of the roof adjoins a space within the building to which persons have access, but not access only for the purpose of carrying out repairs or maintenance.

Designation ⁽¹⁾ of covering of roof or part of roof	Distance from any point on relevant boundary			
	Less than 6 m	At least 6 m	At least 12 m	At least 20 m
BROOF(t4)	✓	✓	✓	✓
CROOF(t4)	✗	✓	✓	✓
DROOF(t4)	✗	✓ ⁽²⁾⁽³⁾	✓ ⁽²⁾	✓
EROOF(t4)	✗	✓ ⁽²⁾⁽³⁾	✓ ⁽²⁾	✓ ⁽²⁾
FROOF(t4)	✗	✗	✗	✓ ⁽²⁾⁽³⁾

✓ Acceptable for use at the specified distance. ✗ Not acceptable for use at the specified distance.

Table 1: Separation distances by the type of roof covering and the size and use of building.

NB Separation distances do not apply to enclosed / covered walkways. However, see Diagram 8.2 if the roof passes over the top of a compartment wall.

Polycarbonate and uPVC rooflights that achieve a class C-s3,d2 rating by test may be regarded as having a BROOF(t4) classification.

1. Roof constructions are classified within EN 13501-5 as BROOF(t4), CROOF(t4), DROOF(t4), EROOF(t4) or FROOF(t4) in accordance with BS EN 13501-5. BROOF(t4) indicates the highest performance and FROOF(t4) the lowest.

2. Not acceptable on any of the following buildings.

a. Industrial, storage or other non-residential purpose group (purpose groups 6 and 7) buildings of any size.

b. Any other buildings with a cubic capacity of more than 1500 m³.

3. Acceptable on buildings not listed in (1) if both of the following apply.

a. Part of the roof has a maximum area of 3 m² and is a minimum of 1500 mm from any similar part.

b. The roof between the parts is covered with a material rated class A2-s3,d2 or better.

Compliance Routes for Kingspan's Roof Insulation Solutions

Kingspan Insulation offers a number of roof insulation solutions as part of the following ranges:

- Kingspan Thermarook®;
- Kingspan Thermataper®;
- Kingspan OPTIM-R®;
- Kingspan OPTIM-R® E;
- Kingspan QuadCore®; and
- Kingspan GreenGuard®

Relevant Buildings Above 18 m

Products that form part of the roof system can be used on roofs provided they meet the requirements of Table 1 or are used in a build-up intended to be fully covered by inorganic materials, as detailed in the previous page. Balconies need to comply with Regulation 7(2) and, therefore, the products above cannot be used for balcony applications.

Non-relevant Buildings Above 18 m

Products that form part of the roof system can be used on roofs provided they meet the requirements of Table 1 or are used in a build-up intended to be fully covered by inorganic materials as detailed in the previous page.

Test Data

Kingspan Insulation's roof products have been classified in a range of common build-ups to BS EN 13501-5. As the test method involves the insulation in end-use application, testing is typically carried out by the waterproofing manufacturer for the system or build-up.



National College for High Speed Rail, Birmingham.

Other Design Considerations

Factors to Consider

Irrespective of the chosen route to compliance, there are other fundamental aspects of the building design that must be considered. For example, correct and effective cavity barrier detailing, use of compartmentation to limit internal fire spread, or the separation distance between buildings so as to limit the risk of fire spreading from one building to another.

Whilst the fire performance of the building envelope is a vital element of good construction, it is just one of a number of factors that should influence the façade insulation specification. Since the primary role of the insulation is to conserve energy, thermal performance must also be a key consideration. Other considerations include:

- BBA certification;
- LABC Registered Detail status;
- environmental impact and responsible sourcing;
- moisture resistance, air-infiltration and durability;
- insulant thickness and weight, thus associated load implications;
- cost and Return on Investment (ROI);
- daylight inside the building;
- ease of installation;
- availability and logistics; and
- access to technical support from specification through installation to maintenance.

None of these elements should be regarded in isolation. They should be considered in the context of the building as a whole - its overall design, its intended use, and any associated risks or benefits arising from selected materials in situ.

Kingspan Insulation

Company Details

Kingspan Insulation Ltd is part of the Kingspan Group plc., one of Europe's leading construction product manufacturers. The Kingspan Group was formed in the late 1960s and is a publicly quoted group of companies headquartered in Kingscourt, County Cavan, Ireland.

Kingspan Insulation Ltd is a market leading manufacturer of premium and high performance rigid insulation products and insulated systems for building fabric and building services applications.

Products & Applications

Kingspan Insulation Ltd has a vast product range. Kingspan Insulation Ltd products are suitable for both new build and refurbishment in a variety of applications within both domestic and non-domestic buildings. The available insulation solutions are listed below.

- Pitched Roofs
- Flat Roofs
- Green Roofs
- Cavity Walls
- Solid Walls
- Timber and Steel Framing
- Insulated Cladding Systems
- Insulated Render Systems
- Floors
- Soffits
- Ductwork

Further Solutions:

- Insulated Dry-Lining
- Tapered Roofing Systems
- Cavity Closers
- The Kingspan KoolDuct® System
- Kingspan nilvent®
- Kingspan TEK® Building System

Insulation Product Benefits

Kingspan OPTIM-R® Vacuum Insulation Panel (VIP) Products

- With a declared value thermal conductivity of 0.007 W/mK, these products provide an insulating performance that is up to five times better than commonly used insulation materials.
- Provides high levels of thermal efficiency with minimal thickness.
- Over 90% (by weight) recyclable.

Kingspan Kooltherm® and Kooltherm® 100 Products

- With a thermal conductivity of 0.018–0.023 W/mK these are the most thermally efficient insulation products commonly used.
- The thinnest commonly used insulation products for any specific U-value.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Kingspan QuadCore®

- With a thermal conductivity of 0.021 W/mK this is amongst one of the more thermally efficient insulation products commonly used.
- Offering excellent thermal and fire performance, enhanced environmental credentials and backed by an extended warranty.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Kingspan Therma™ Products

- With a thermal conductivity of 0.022–0.028 W/mK these are amongst the more thermally efficient insulation products commonly used.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Kingspan GreenGuard® Products

- Rigid extruded polystyrene insulation (XPS) has the necessary compressive strength to make it the product of choice for specialist applications such as heavy duty flooring, car park decks and inverted roofing.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

All Products

- Unaffected by air infiltration - a problem that can be experienced with mineral fibre and which can reduce thermal performance.
- Safe and easy to install.
- If installed correctly, can provide reliable long term thermal performance over the lifetime of the building.
- Each product achieves the required fire performance for its intended application.

Contact Details

Kingspan Insulation Ltd

Pembridge | Leominster
Herefordshire | HR6 9LA

T: +44 (0) 1544 388 601

E: info@kingspaninsulation.co.uk

www.kingspaninsulation.co.uk

For individual department contact details please visit

www.kingspaninsulation.co.uk/contact

Kingspan Insulation Ltd reserves the right to amend product specifications without prior notice. Product thicknesses shown in this document should not be taken as being available ex-stock and reference should be made to the current Kingspan Insulation price-list or advice sought from Kingspan Insulation's Customer Service Department. The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified for suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a Technical Advisory Service, the advice of which should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of this literature is current by contacting the Kingspan Insulation Marketing Department.

© Kingspan, Kingspan GreenGuard, KoolDuct, Kooltherm, nilvent, OPTIM-R, QuadCore, TEK and the Lion Device are Registered Trademarks of the Kingspan Group plc in the UK, Ireland and other countries. All rights reserved.

TM K-Roc and Therma are Trademarks of the Kingspan Group plc.

Kingspan Insulation Ltd is not associated with, and its products have not necessarily been tested by, the GREENGUARD Environmental Institute.

Registered in England & Wales, No. 01882722. Registered Office: Pembridge, Leominster, Herefordshire HR6 9LA UK. VAT GB428602456.

